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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/791,607

03/01/2004

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67,200-1259

2041

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01/11/2007

EXAMINER

THOMAS, TONIAE M

ART UNIT

PAPER NUMBER

2822

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/11/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/791,607

Applicant(s)

LAI ET AL.

Examiner

Toniae M. Thomas

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 1-21 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 40 is/are allowed.
- 6) ☒ Claim(s) 22,24,25,34,36 and 37 is/are rejected.
- 7) ☒ Claim(s) 23, 26-33, 35, 38-39 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

1. This action is a first Office action on the merits of Application Serial No. 10/791,607. Currently, claims 1-40 are pending.

***Election/Restrictions***

2. Applicant's election with traverse of Group II, claims 22-40, in the reply filed on 20 November 2006 is acknowledged. The traversal is on the ground(s) that "the present invention structure can only be produced by forming a spacer that has a partially exposed sidewall region at an upper portion of the spacer defining a phase change memory element contact area, and cannot be produced by selectively depositing a layer of material such that it only covers a lower portion of the spacer. This is not found persuasive for reasons as follows.

3. As explained in the restriction requirement mailed on 29 December 2005, the product (structure) as claimed requires a spacer that has a partially exposed sidewall region/positive radius of curvature at the spacer upper portion. In one method, the sidewall region/positive radius of curvature at the spacer upper portion is exposed by first blanket depositing a layer of material; then performing an etching back process to expose the sidewall region/positive radius of curvature at the spacer upper portion. In another and materially different process, the sidewall region/positive radius of curvature at the spacer upper portion is exposed by selectively depositing a layer of material such that

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it covers only a lower portion of the spacer, thereby leaving the sidewall region/positive radius of curvature at the spacer upper portion exposed.

4. The requirement is still deemed proper and is therefore made FINAL.

5. Claims 1-21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

#### ***Claim Objections***

6. Claims 38 and 39 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite the claims in independent form. Both claim 38 and claim 39 depend from claim 22, yet neither claim further limits claim 22. Specifically, each of claims 38 and 39 recite the phrase "the SOL layer." However, claim 22 does not recite a "SOL layer." Moreover, previous claims 23-34 do not recite a "SOL layer."

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 24, 38, and 39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The following claim recitations lack antecedent basis: “the phase changing material” (claim 24, line 2), and “the SOL layer” (claim 38, line 2; claim 39, line 2).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

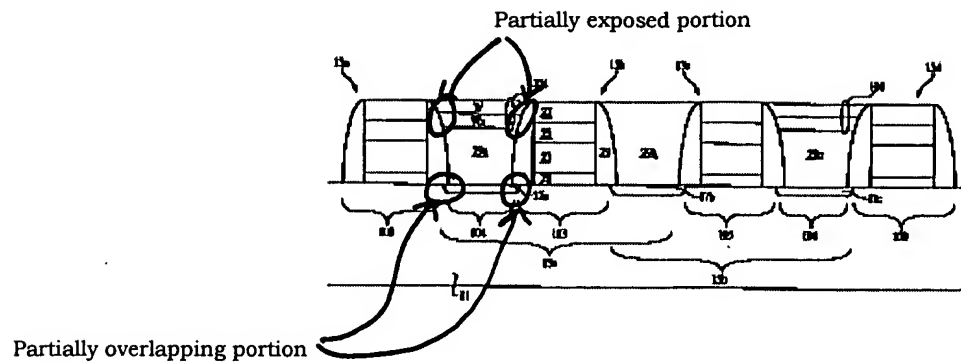
A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. *Claims 22, 24-25, 34 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Moore (US 2003/0038301 A1).*

The Moore application publication (referred to hereinafter as Moore) discloses a phase change memory structure (figs. 1-6 and accompanying text). The phase change memory structure comprises: a substrate 11 (fig. 1 and par. 0016, lines 1-2) comprising a conductive area, source/drain region 17a (fig. 1 and par. 0016, lines 7-9); a spacer 29 having a partially exposed sidewall region at the spacer upper portion defining a phase change memory element contact area (fig. 1 and par. 0016, lines 13-14); wherein the spacer bottom portion partially overlaps the conductive area (fig. 1).

As shown in the illustration below, the spacer 29 has a sidewall portion that is partially exposed by the polysilicon plug 29a.

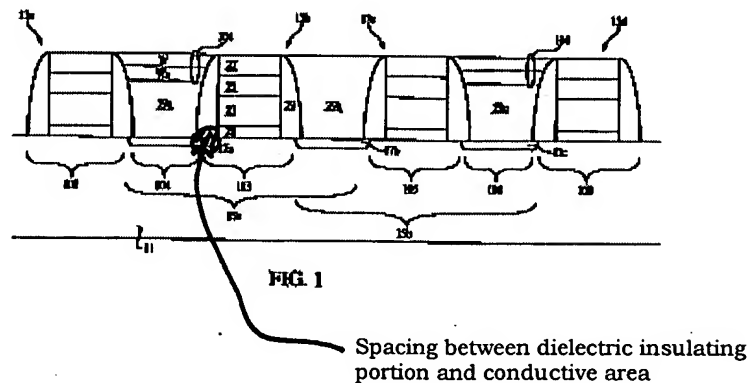


The phase changing material comprises a chalcogenide (fig. 3 and par. 0018, lines 5-6).

The chalcogenide comprises Ge (par. 0018, lines 5-6).

The spacer is disposed adjacent a sidewall of a dielectric insulating portion, capping insulator 27 (fig. 1 and par. 0016, lines 9-14).

The dielectric insulating portion is disposed spaced apart from the conductive area (fig. 1).



### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moore in view of Liaw (US 6,013,547).

Moore does not teach that the dielectric insulating portion, capping insulator 27, comprises silicon oxide selected from the group consisting of PECVD oxide, PETEOS, BPTEOS, BTEOS, PTEOS, TEOS, PEOX, low-K dielectric, and fluorine doped silicate glass (FSG).

Liaw discloses a semiconductor device, which includes a polycide gate structure 7 (fig. 1B and col. 3, lines 5-6). The polycide gate structure comprises a capping layer 6, wherein in one embodiment, the capping layer comprises a PECVD oxide deposited using TEOS (col. 3, lines 50-54).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify Moore by replacing the nitride capping insulator 27 with a PECVD oxide, as taught by Liaw, because a PECVD oxide is an art-recognized suitable insulator that may be used for a capping insulator, in place of a silicon nitride layer, in a polycide structure.

***Allowable Subject Matter***

10. Claims 23, 26-33, 35, and 38-39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening

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claims. Claim 40 is allowable over the prior art of record. The prior art of record does not anticipate or render obvious a phase change memory structure substantially as claimed, wherein the memory structure comprises spacers, which comprise a material selected from the group consisting of a conductive material and a phase change material sensitive to temperature.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*J. M. Thomas*

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Art Unit 2822

TMT

29 December 2006